

Sept. 4, 1928.

E. M. R. WEINER ET AL

1,682,945

CENTRIFUGAL VACUUM PUMP

Filed Aug. 21, 1924

3 Sheets-Sheet 1

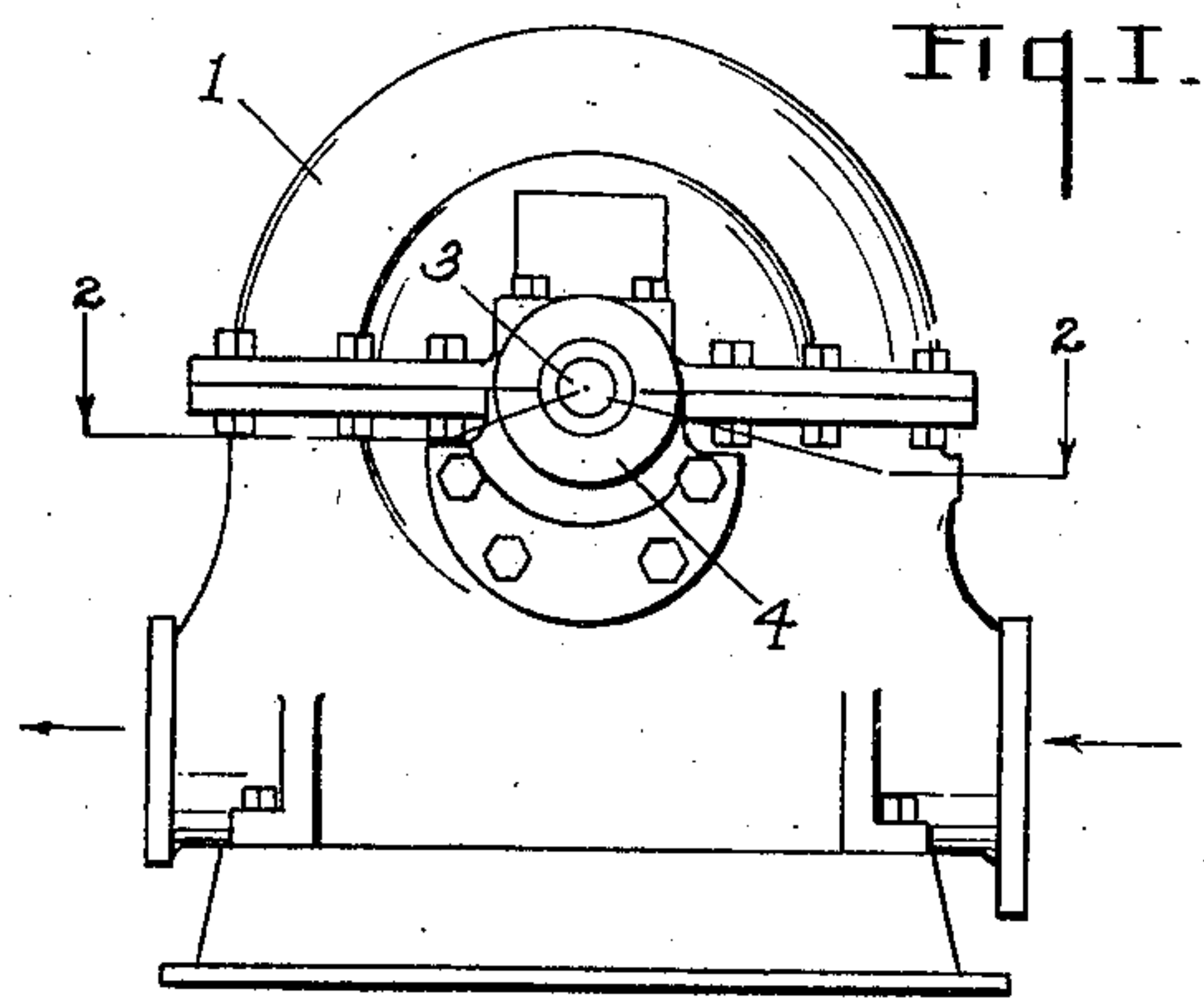


Fig. I.

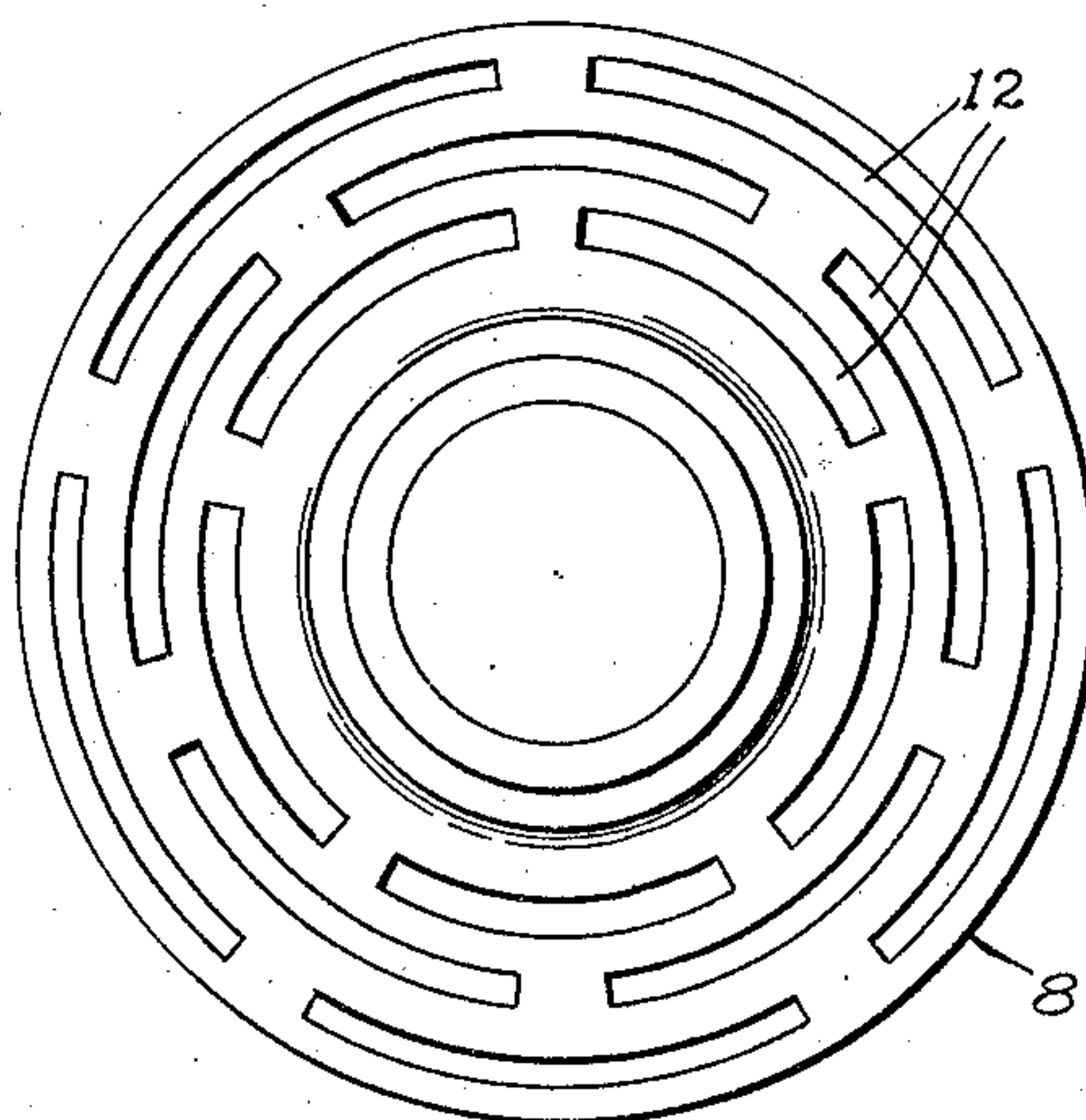


Fig. III.

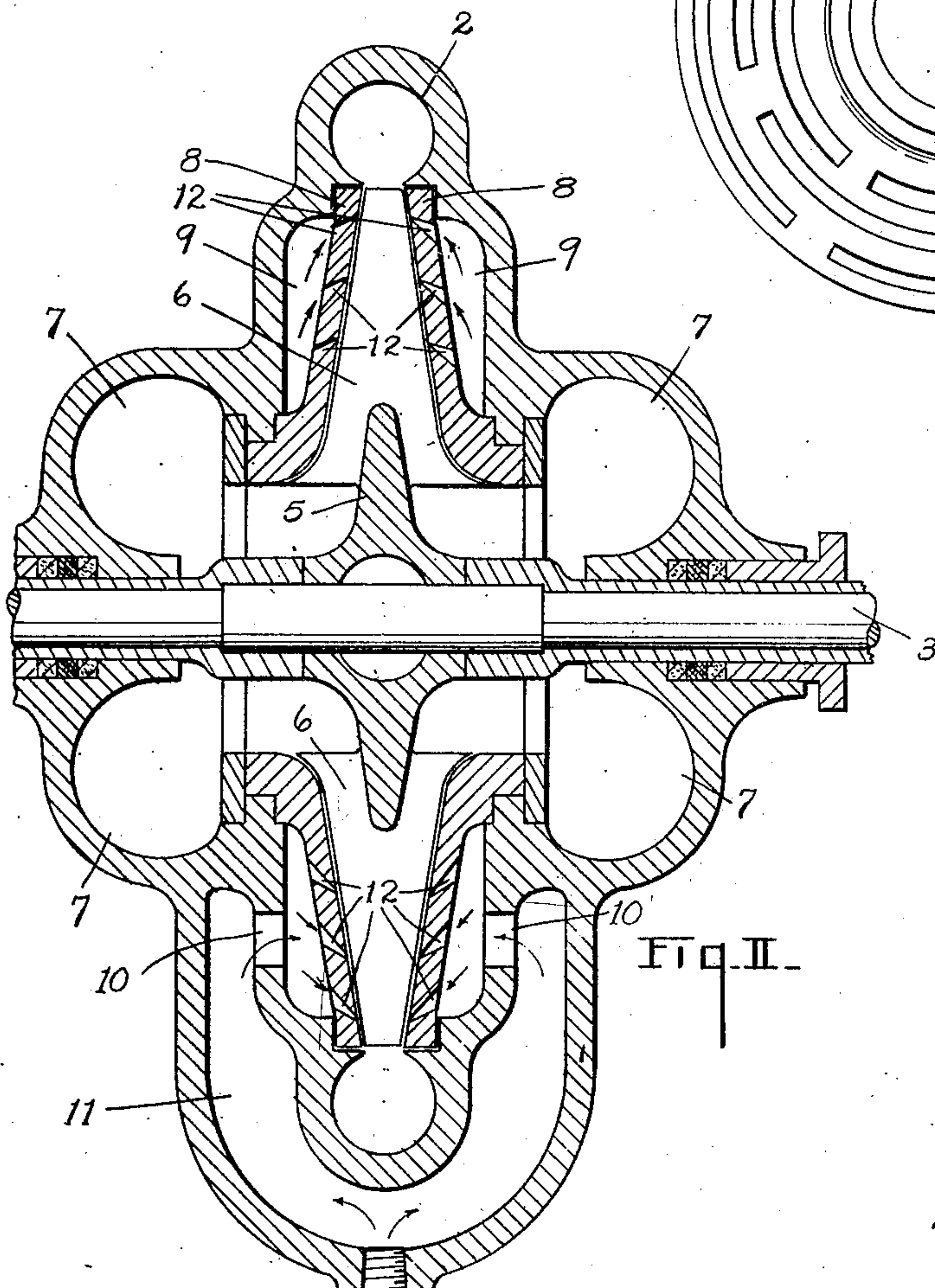


Fig. II.

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3 Sheets-Sheet 2

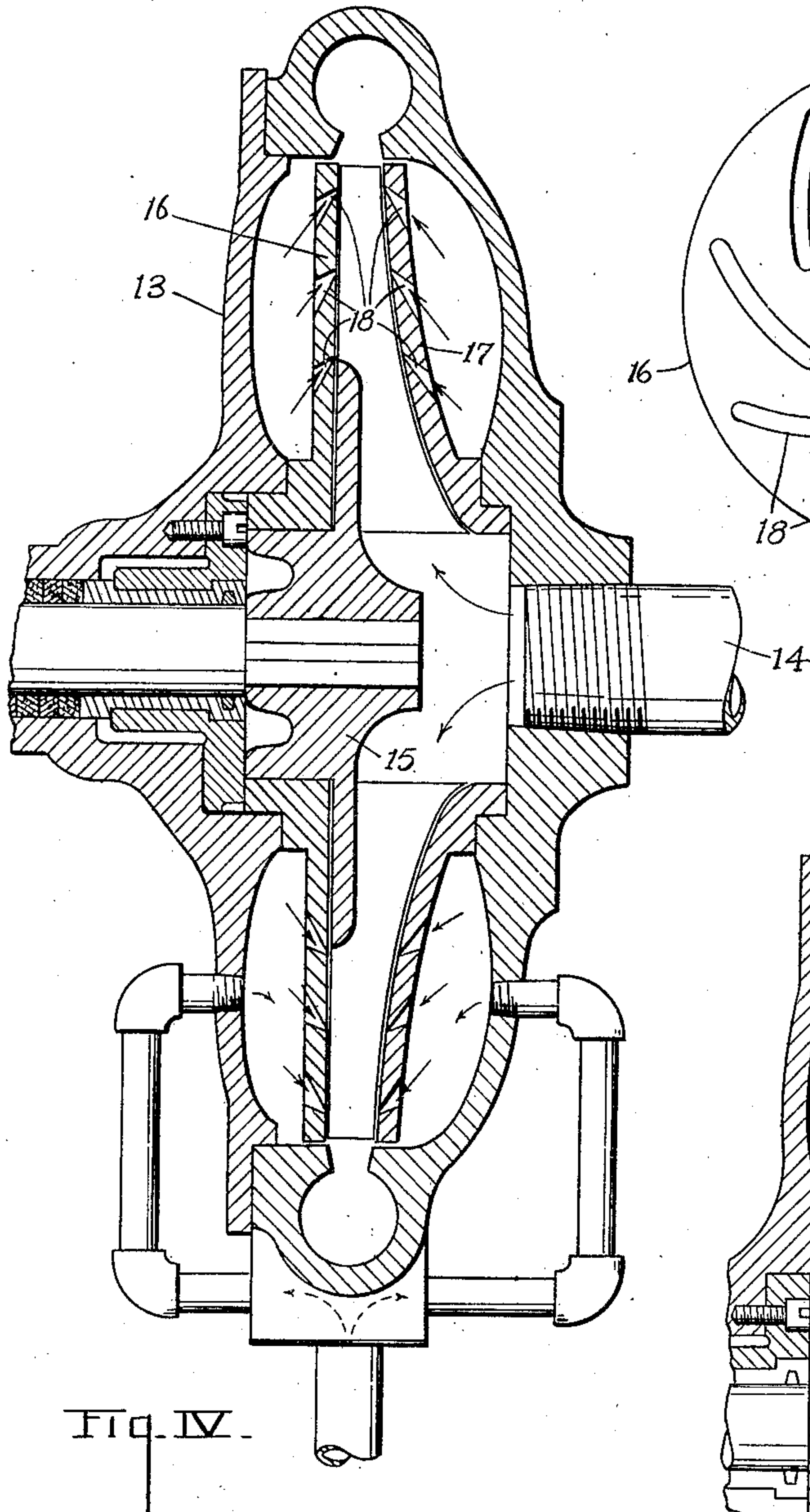


Fig. IV.

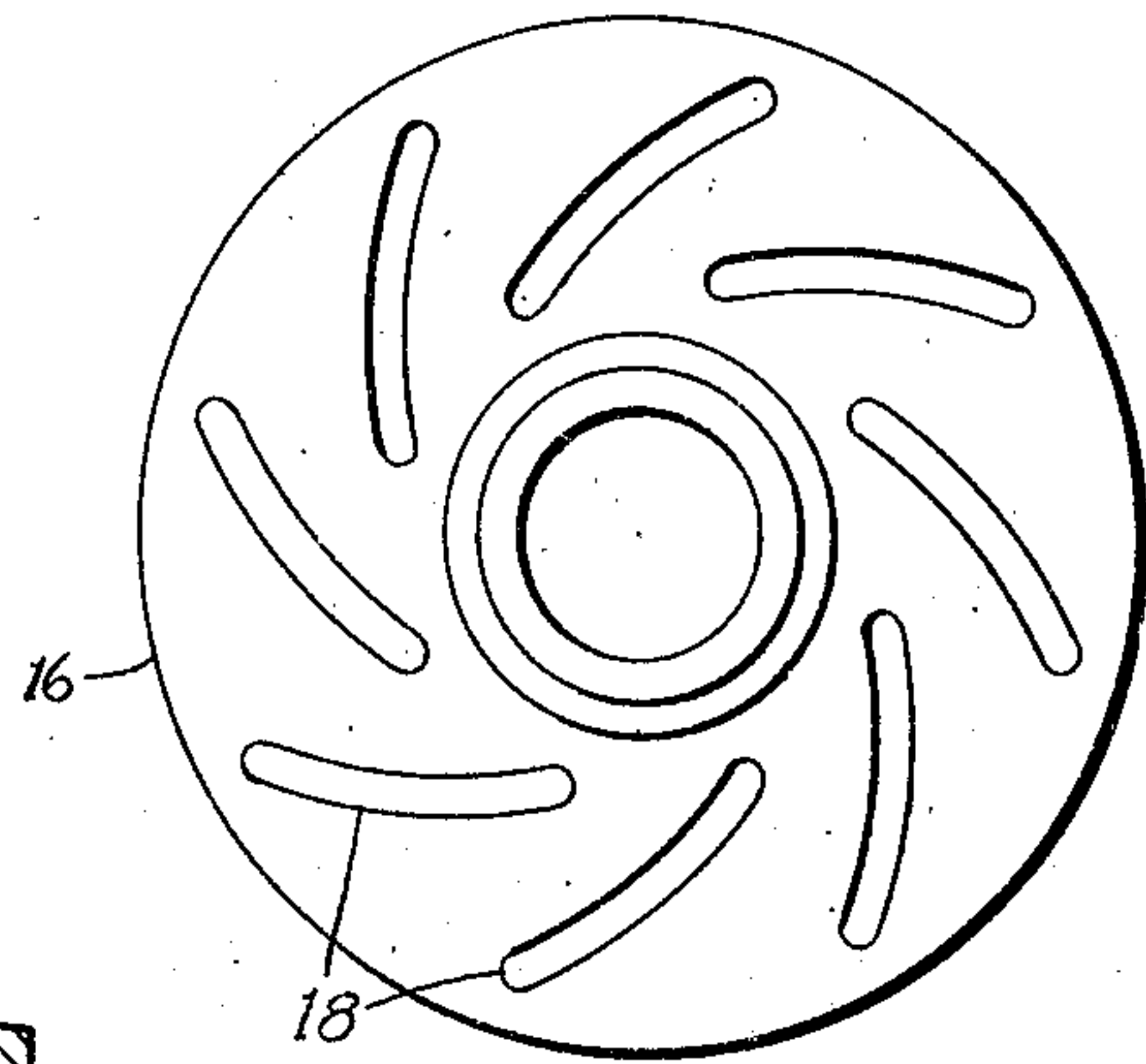


Fig. V.

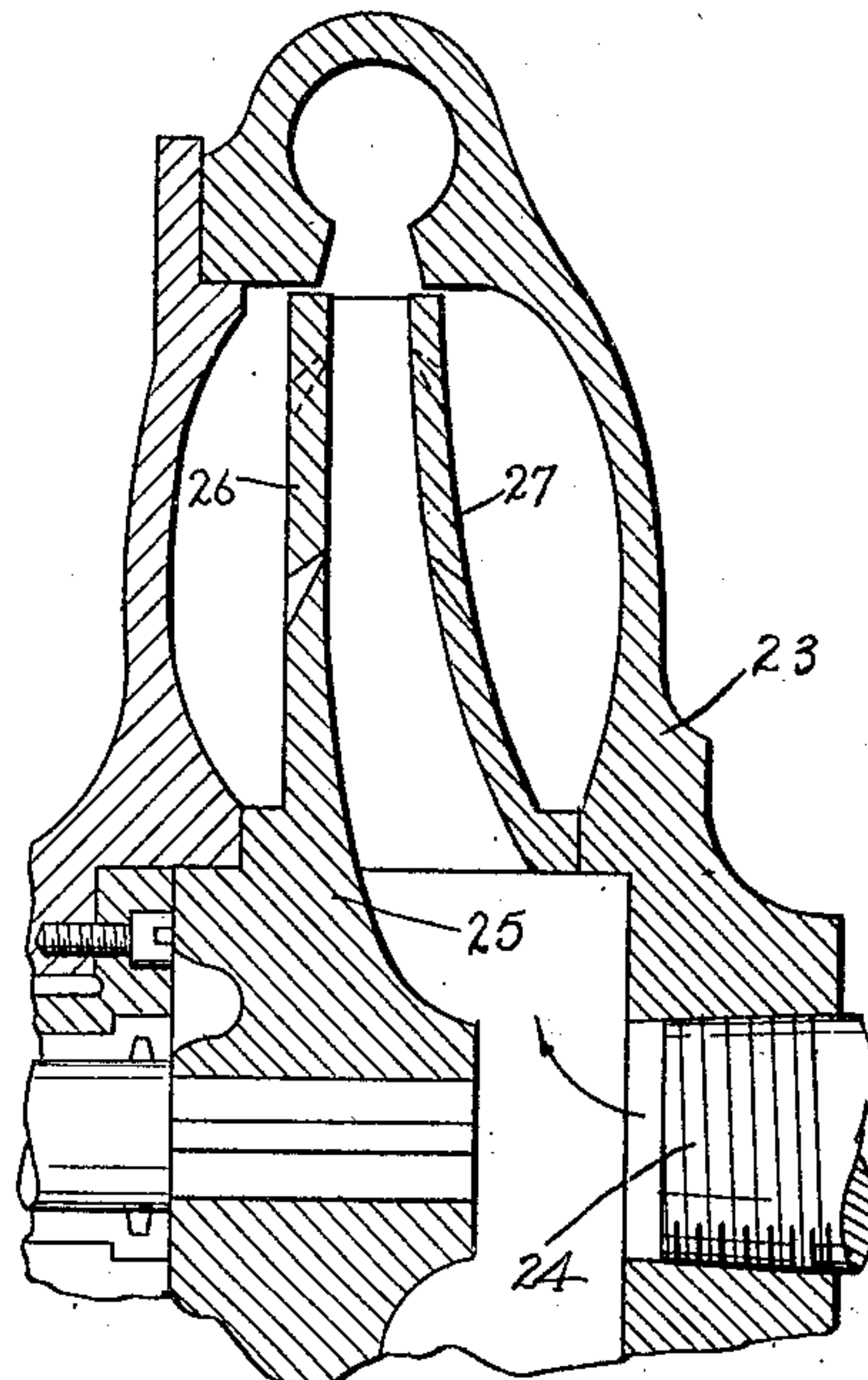


Fig. VII.

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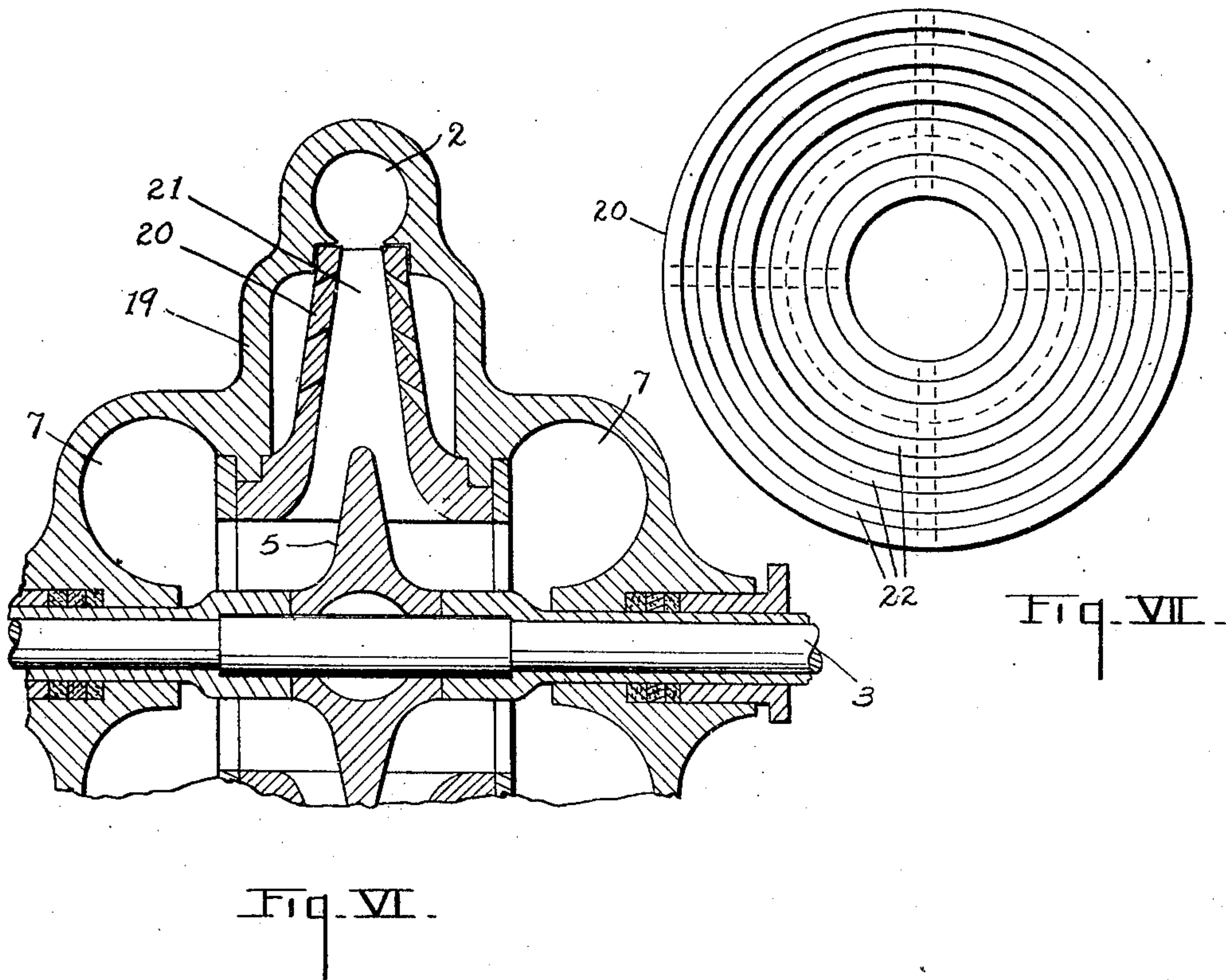
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE.

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CENTRIFUGAL VACUUM PUMP.

Application filed August 21, 1924. Serial No. 733,415.

This invention relates to improvements in centrifugal vacuum pumps.

The main objects of this invention are:

First, to provide an improved vacuum pump of the centrifugal type which is of high efficiency.

Second, to provide an improved pump of this type which is well balanced.

Third, to provide an improved pump having these advantages which is simple and economical in structure and durable in use.

Objects pertaining to details and economies of construction and operation of our invention will definitely appear from the detailed description to follow.

We accomplish the objects of our invention by the devices and means described in the following specification. The invention is clearly defined and pointed out in the claims.

A structure embodying the features of our invention is clearly shown in the accompanying drawing forming a part of this application, in which:

Fig. I is a side elevation of a structure embodying the features of our invention.

Fig. II is a detail view, mainly in section, on a line corresponding to the broken line 2—2 of Fig. I.

Fig. III is a side view of one of the impeller entraining or shroud plates of the embodiment of our invention shown in Fig. II.

Fig. IV is a detail view mainly in section of a modified form of our invention as modified for a single suction pump.

Fig. V is a side view of one of the impeller plates employed in the embodiment shown in Fig. IV.

Fig. VI is a fragmentary section showing our improvements as embodied in a double suction structure in which the impeller shroud or entraining plates are secured to the impeller.

Fig. VII is a side view of one of the entraining or shroud plates of the structure shown in Fig. VI.

Fig. VIII is a fragmentary section of a single suction pump in which the entraining or impeller shroud plates are secured to the impeller to rotate therewith.

In the drawing similar numerals of ref-

erence indicate similar parts throughout the several views.

Referring to the drawing, the pump illustrated in Figs. I and II is of the volute type, the casing being designated generally by the numeral 1 and having the usual volute discharge passage 2. The impeller shaft 3 is supported in bearings 4 carried by bearing brackets projecting from the sides of the casing.

The impeller 5 has a plurality of radial blades 6. The embodiment shown in Figs. I and II is of the double suction type, there being a suction inlet 7 at each side opening into the hub of the impeller. At each side of the impeller blades is an impeller shroud or entraining plate 8, the plates being mounted in the casing so as to provide annular air chambers 9 connected through the ports 10 with the inlet chamber or header 11.

The entraining plates 8 have a plurality of segmental slots 12 disposed concentrically relative to the axis of the impeller and in overlapping relation as clearly shown in Fig. III. These slots taper inwardly as shown in Fig. II.

These impeller shroud plates or entraining plates are disposed with their inner sides in close proximity to the blades of the impeller so that as the water is driven past the slots an ejector effect is secured and the air is drawn through the slots in substantial volume. The slots are arranged so that the entire area of the entraining plates is covered or embraced thereby.

In the modification shown in Figs. IV and V we illustrate our invention as embodied in a single suction pump, the casing 13 having a single inlet 14 and the impeller 15 being supported at one end only. In this structure the entraining plate 16 is flat while the plate 17 is curved, the plates corresponding to the edges of the blades. The slots 18 of this embodiment are disposed at an angle to the radial planes of the entraining plates so that in use the water is discharged substantially at right angles across the slots. The slots are tapered as in the embodiment described.

In the embodiment shown in Figs. VI and VII the casing 19 is of the double suction type and the entraining plates or impeller

shroud plates 20 are secured to the impeller blades 21 to rotate therewith. In this embodiment the slots 22 are continuous eccentric slots, the plates being supported by the
5 impeller blades as indicated by dotted lines in Fig. VII.

In Fig. VIII we show the impeller of Fig. VI adapted to a single suction pump, the casing 23 having a single inlet 24 and
10 the impeller 25 having shroud plates 26 and 27 mounted thereon.

Our improved pump is very efficient and relatively little power is required to operate the same, it being well balanced and friction being minimized. At the same time, it
15 is simple and economical in its parts and durable in use. While our improved pump is especially designed by us for use as a vacuum pump, it is however desirable for
20 use purely as a liquid pump as friction is minimized.

Having thus described our invention what we claim as new and desire to secure by Letters Patent is:

25 1. In a pump, the combination of a casing provided with inlets at each side, an impeller provided with blades, and entraining plates mounted in said casing at the sides of said impeller blades and providing annular
30 air chambers at each side, said entraining plates having a plurality of slots therein disposed concentrically relative to the axis of the impeller and arranged in overlapping relation, said slots being of inwardly tapering
35 cross section.

2. In a pump, the combination of a casing provided with inlets at each side, an impeller provided with blades, and entraining plates mounted in said casing at the sides of said
40 impeller blades and providing annular air

chambers at each side, said entraining plates having a plurality of slots therein disposed concentrically relative to the axis of the impeller, said slots being of inwardly tapered
45 cross section.

3. In a pump, the combination of a casing provided with inlets at each side, an impeller provided with blades, and entraining plates mounted in said casing at the sides of said
50 impeller blades and providing annular chambers at each side, said entraining plates having slots therein of inwardly tapering cross section.

4. In a pump, the combination of a casing provided with a suction inlet, an impeller
55 provided with blades, and an entraining plate mounted in said casing at the side of said impeller blades and providing an annular air chamber, said entraining plate having a plurality of slots therein disposed concentrically relative to the axis of the impeller and arranged in overlapping relation, said
60 slots being of inwardly tapering cross section.

5. In a pump, the combination of a casing provided with a suction inlet, an impeller
65 provided with blades, and an entraining plate mounted in said casing at the side of said impeller blades and providing an annular air chamber, said entraining plate having slots therein of inwardly tapering cross
70 section.

6. In a pump, the combination of a casing, an impeller provided with blades, and a shroud plate mounted in said casing at the side of said impeller blades and having slots
75 therein of inwardly tapering cross section.

In witness whereof we have hereunto set out hands.

EDWIN M. R. WEINER.
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